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MODELLING OF AIR FORCE OPERATIONS

By/par

M. Bélanger

December/décembre 1999

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Section Head/chef de section

3 décembre 99
Date

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ABSTRACT

This document presents a modelling of the operations executed by the Air Force. Four different aspects characterize this decomposition:

- what the Air Force does;
- why it is done;
- how it is done; and
- the infrastructure needed to do it.

RÉSUMÉ

Ce document présente une modélisation des opérations réalisées par les forces armées aériennes. Cette décomposition est caractérisée par quatre aspects différents :

- ce que font les forces armées aériennes,
- à quelles fins elles le font,
- de quelle façon elles le font,
- l'infrastructure nécessaire pour le faire.

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EXECUTIVE SUMMARY

This document presents a decomposition of Air Force operations that was realized in order to have a better understanding of the Air Force operations. This decomposition presents four different aspects of Air Force operations:

- What the Air Force does;
- Why it is done;
- How it is done; and
- The infrastructure needed to do it.

The decomposition provided in this document is not exhaustive in the sense that it does not cover everything that could eventually be done by the Air Force. Accordingly, this decomposition should evolve in time.

LIST OF ACRONYMS AND ABBREVIATIONS

1CAD/CANR	1 Canadian Air Division/Canadian NORAD Region
AF	Air Force
AOO	Area of Operation
C&C	Command and Control
CF	Canadian Forces
DND	Department of National Defence
DREV	Defence Research Establishment Valcartier
DSS	Decision Support System

1.0 INTRODUCTION

The Decision Support Technologies Section of the Defence Research Establishment, Valcartier (DREV) is carrying out a research and development program in command and control information systems applied to the Air Force (AF). DREV is developing decision support technologies, processes, and methodologies that will provide the commander and staff (at different organizational levels: from Commander 1CAD/CANR to flying units) with automated capabilities to exercise command and control. This program is now working on specific problems identified by the Air Force operators such as Airspace Violation Problem, Search & Rescue activities and dynamic planning and execution. Eventually, DREV will address problems through all the organizational levels.

This document presents a decomposition of Air Force operations that was realized in order to have a better understanding of the Air Force operations. This decomposition presents four different aspects of Air Force operations:

- What the Air Force does;
- Why it is done;
- How it is done; and
- The infrastructure needed to do it.

Even if many documents describe the various operations that the Air Force executes (Ref. 1,2,3,4), none describes these four aspects in a same decomposition. This decomposition does not want to provide details information on how to realize the different actions of an operation, but rather wants to presents the principal aspects of Air Force operations.

In order to better understand the Air Force operations, section 2 presents the AF mission which is the "raison d'être" of the AF, and two different decompositions of the AF operations. The rest of this document presents a modelisation of the Air Force operations proposed by DREV. This decomposition is not exhaustive, in the sense that it does not cover everything that could eventually be done by the Air Force. Accordingly, this decomposition should evolve in time. This work was done in order to better understand operations done by the AF and could be of use to develop appropriate Decision Support System (DSS) for the Air Force.

This work was carried out at DREV between January 1998 and September 1998 under work unit 3AA12, Decision Support Applications.

2.0 CANADA'S AIR FORCES MISSION

The mission of the Air Force is to generate and maintain combat-capable, multi-purpose air forces to meet Canada's Defence Mission (DMs) (Ref. 1):

DM1 Defending Canada – protecting Canada's national territory and areas of jurisdiction; helping civil authorities protect and sustain national interest; ensuring an appropriate level of prepared emergency across Canada; and assisting in national emergencies;

DM2 Defending North America – protecting the Canadian approaches to the continent in partnership with the United States, particularly through NORAD; promoting Arctic security; and pursuing opportunities for defence cooperation with the US in other areas; and

DM3 Contributing to International Security – participating in a full range of multilateral operations through the UN, NATO, other regional organizations and coalitions of like-minded countries; supporting humanitarian relief efforts and restoration of conflict-devastated areas; and participating in arms control and other confidence-building measures.

Whether over land or sea, air power can provide four fundamental security services (Ref. 1):

- the control of the aerospace environment;
- the movement of personnel and materiel;
- the acquisition of intelligence;
- and if necessary, the application of coercive force.

In the context of AF capabilities-based planning, these four security services have coalesced around six operational and three support capability areas (Fig. 1). These nine capability areas represent the entire spectrum of Air Command's operational and support activities, and form the basis of the AF capability structure – the single most important aspect to AF's capability-based business planning methodology.

AIR FORCES CAPABILITY STRUCTURE

OPERATIONAL CAPABILITIES

AF 1 AEROSPACE CONTROL

AF 1.1 Aerospace Surveillance Readiness - Operations.
AF 1.2 Aerospace Control - Readiness
AF 1.3 Air Interdiction Readiness (other than direct support to CC1, and CC2).
AF 1.4 Air-to-Air Refueling Readiness.
AF 1.5 Contingency Aerospace Surveillance Operations.
AF 1.6 Aerospace Control Operations.
AF 1.7 Air Interdiction Operations (other than sup't to CC1/CC2).
AF 1.8 Air-to-air Refueling Operations.
AF 1.9 Sig Int and EW Ops.

AF 2 AIR SUPPORT TO MARITIME COMPONENT

AF 2.1 Integral Air Support to Maritime Readiness.
AF 2.2 Direct Air Support to Maritime Readiness.
AF 2.3 Integral & Direct Air Support to Maritime Operations.

AF 3 AIR SUPPORT TO LAND COMPONENT

AF 3.1 Integral/Organic Air Support to Land Readiness.
AF 3.2 Direct Air Support to Land Readiness (other than A.3.1).
AF 3.3 Integral & Direct Air Support to Land Operations (Including Medevacs).

AF 4 AIR MOBILITY

AF 4.1 Airlift Support to CF - Readiness.
AF 4.2 Airlift Operations.

AF 5 AIR SUPPORT TO NATIONAL INTERESTS

AF 5.1 Search and Rescue Operations.
AF 5.2 Surface Patrols/Surveillance.
AF 5.3 Public Awareness Development.
AF 5.4 Humanitarian/Emergency Services.
AF 5.5 Domestic and NORAD/NATO Airspace Management.
AF 5.6 Counter-drug/Law Enforcement
AF 5.7 VVIP/VIP airlift.
AF 5.8 Air Support to JTF2.
AF 5.9 Other Govt. Support (Misc).
AF 5.10 Additional taskings.

AF 6 CONTINGENCY CAPABILITY

AF 6.1 Contingency Support Readiness.
AF 6.2 Contingency Support Operations.

SUPPORT CAPABILITIES

SC 1 COMMAND AND CONTROL

SC 1.1 Corporate management.
SC 1.2 Strategic Direction.
SC 1.3 Force Employment.
SC 1.4 Force Generation Personnel, Equip, and Infrastructure.
SC 1.5 Command and Control Operations.

SC 2 FORCE GENERATION

SC 2.1 MOC & Air Specialty Training.
SC 2.2 Professional Development Training and Education.
SC 2.3 Surge MOC/Air Specialty Training.
SC 2.4 Operations & Plant Management.
SC 2.5 Administrative, Comptroller & Personnel Support.
SC 2.6 Logistics Support
SC 2.7 Survival to Operate
SC 2.8 Engineering, Test and Evaluation.
SC 2.9 Support to Cadets, Rangers, Lodger Units and Regional Responsibility
SC 2.10 Resource Management

SC 3 MANDATED PROGRAMS

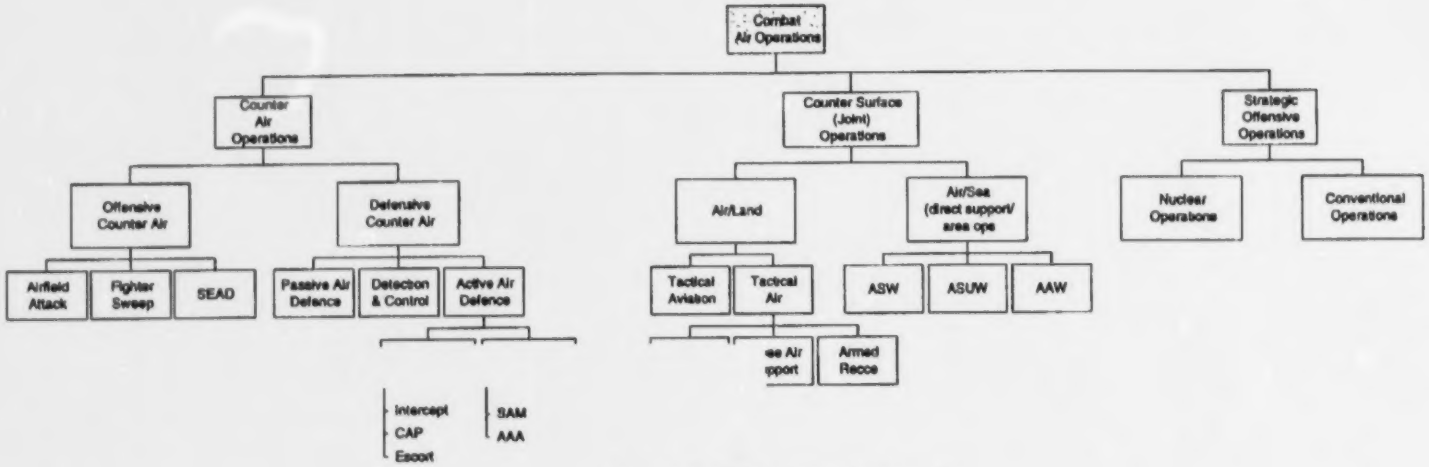
SC 3.1 Government Mandated Programs
SC 3.2 DND Mandated Programs
SC 3.3 AIRCOM Initiated Programs

Figure 1 - Air Forces Capability Structure (Ref. 4)

The AF operations decomposition presented in the Planning Guidances (Ref. 1, 2, 3) is based on capabilities that are suitable to the AF. A capability is being define as the power, skill and abilities necessary to carry out a military activity (function or operation). This decomposition has three different levels: the Capability Areas in support of Defence Missions (ex. operational and support) are decomposed in Capability Elements (ex. AF1 Aerospace control, etc.) which are also decomposed in Capability Tasks and Sub-Tasks (ex. AF1.1 Aerospace Surveillance Readiness – Operations)

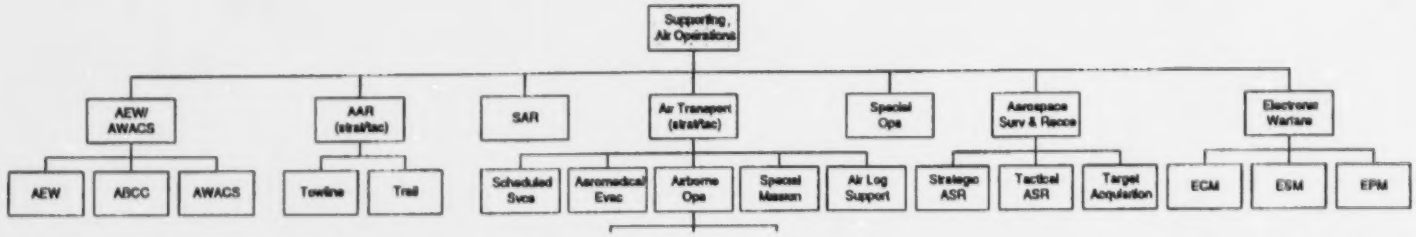
Another decomposition of AF operations is presented in the Aerospace Doctrine of the Air Force (Ref. 4). This document presents the AF operations according to three different aspects:

- The undertaking of offensive and defensive operations against enemy forces and positions by an inter-related group of air power combat activities (Combat Operations) presented in Figure 2;
- The non-combat air operations which enhance the combat capability of other air, land and maritime forces (Supporting Air Operations) presented in Figure 3;
- The non-flying activities required to provide direct support for combat and supporting air operations (Sustainment Operations) presented in Figure 4.



Annex to Chapter 8 - Combat Air Operations

Figure 2 –Combat Air Operations



Annex to Chapter 9 - Support to Air Operations

Figure 3 – Support to Air Operations

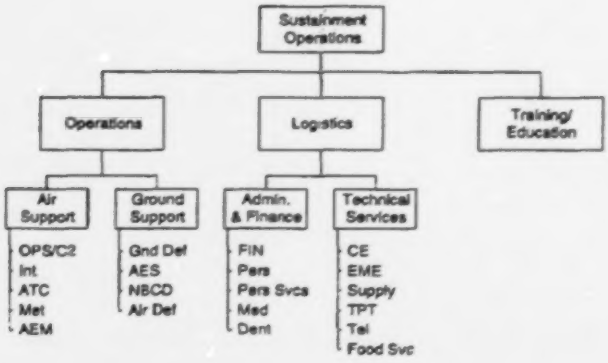


Figure 4 –Sustainment Operations

3.0 AIR FORCE OPERATIONS DECOMPOSITION

Based on our understanding of the AF doctrine (Ref. 4) and the Planning Guidances (Ref. 1, 2, 3), there are four aspects to consider when describing AF operations. These are:

- What is asked to the AF: what type of operations should be executed by the AF;
- Why the AF should execute this operation. Often, it is a response to a political request;
- What are the basic activities (missions) that have to be accomplished in order to execute this operation;
- What is the infrastructure required to make these basic missions possible.

Following this line of thought, we determined a decomposition of Air Force operations based on four different axes:

- The type of requests that was received by the Air Force (why the AF is doing specific operations);
- The type of operations that the AF is capable of executing (what is the AF doing);
- The basic missions that are needed to accomplish the different operations (the how the AF is doing it) and finally ;
- The capabilities to sustain the non-flying activities in support of any mission execution (the infrastructure needed to do it).

Accordingly, different types of operations can be done for the same air support request, different basic missions may be needed to execute a specific type of operations and a whole set of sustained capabilities may have to be in place to make happen one basic mission.

The following sections briefly present the decomposition of each axis.

3.1 Types of requests

In order to assist the Canadian government in the realization of its policies, the Air Force is responsible to realize some tasks and has to provide the air support to other governments, government departments, as well as to maritime forces, land forces and Joint Task Force 2 (JTF2).

Figure 5 presents the types of requests received by the AF to provide support for the realization of Canadian Policies. It may be seen as the reason why the AF exists. Accordingly, these types of requests are subject to modification in accordance with any political orientation that the Canadian Government may decide to take.

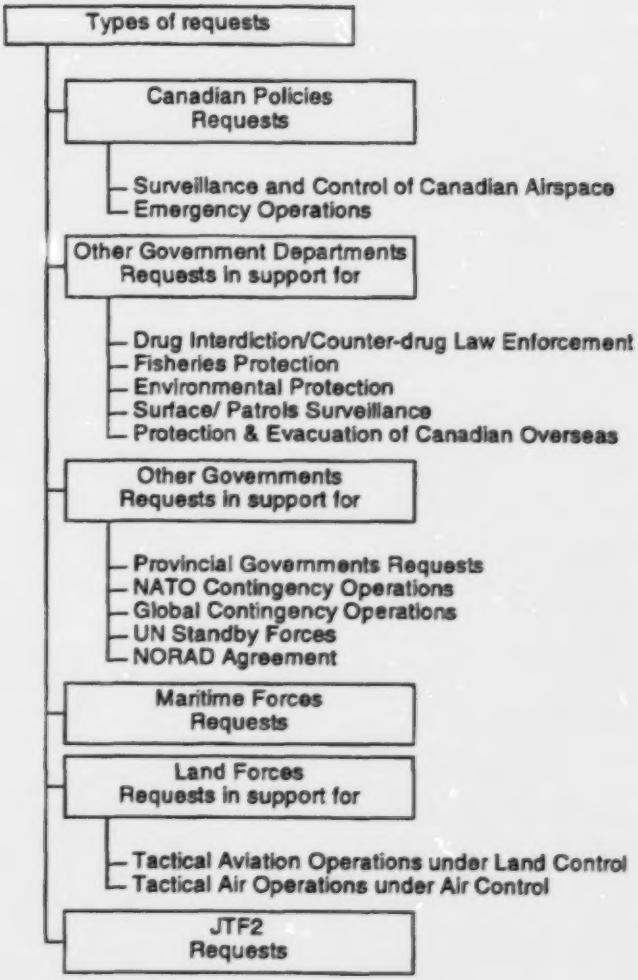


Figure 5 – Types of Requests

3.2 Types of air force operations

In order to realize the tasks that are asked to them, the AF have to execute different types of operations. The operations that the AF can do can be divided into 6 categories: surveillance, humanitarian, emergency search and rescue, peace support, civil support and special. Figure 6 presents the air force operations of each one of these categories.

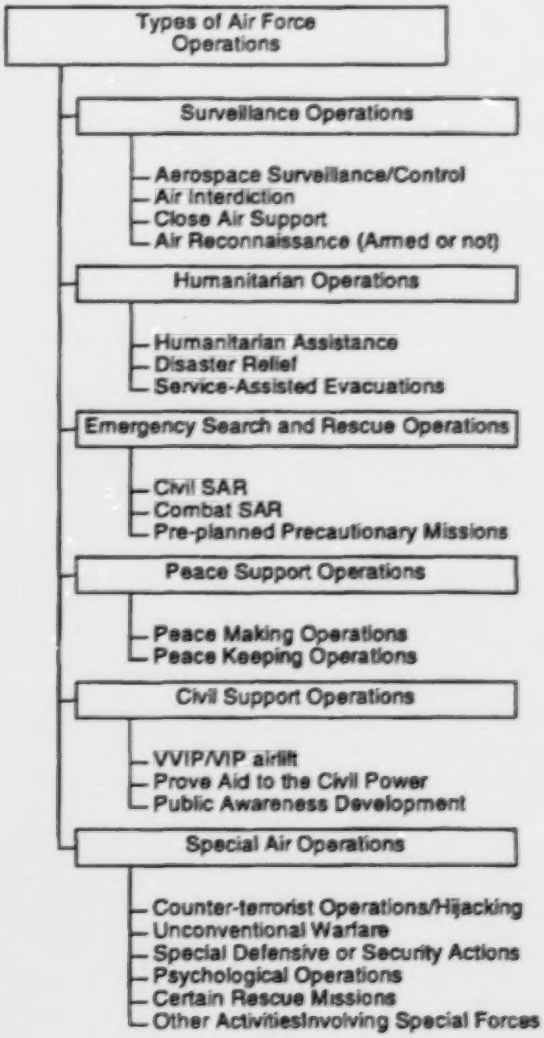


Figure 6 – Types of Operations

3.3 Basic missions

In order to execute an operation, the AF has to execute one or many different actions. These actions are called basic mission capabilities and represent the different roles that the AF assets can be played out when participating in an operation. The AF assets may be used in three different ways (Figure 7):

1) To execute a pro-active air mission (Figure 8);
2) To provide mobility assistance to a mission (Figure 9);
3) To command a CF Joint Operation (Figure 10).

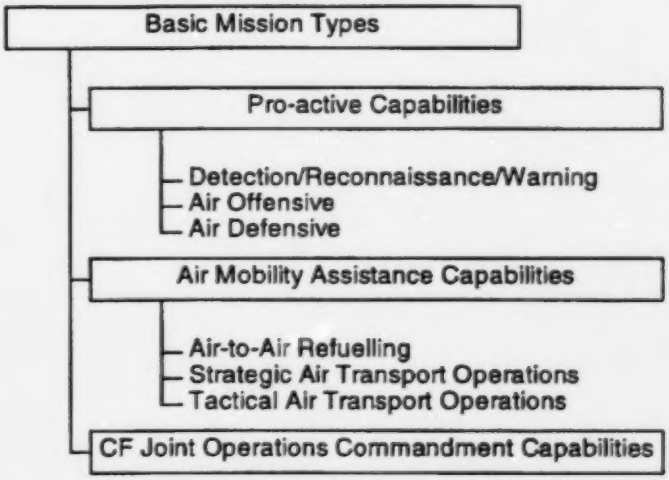


Figure 7 – Basic Mission Capabilities

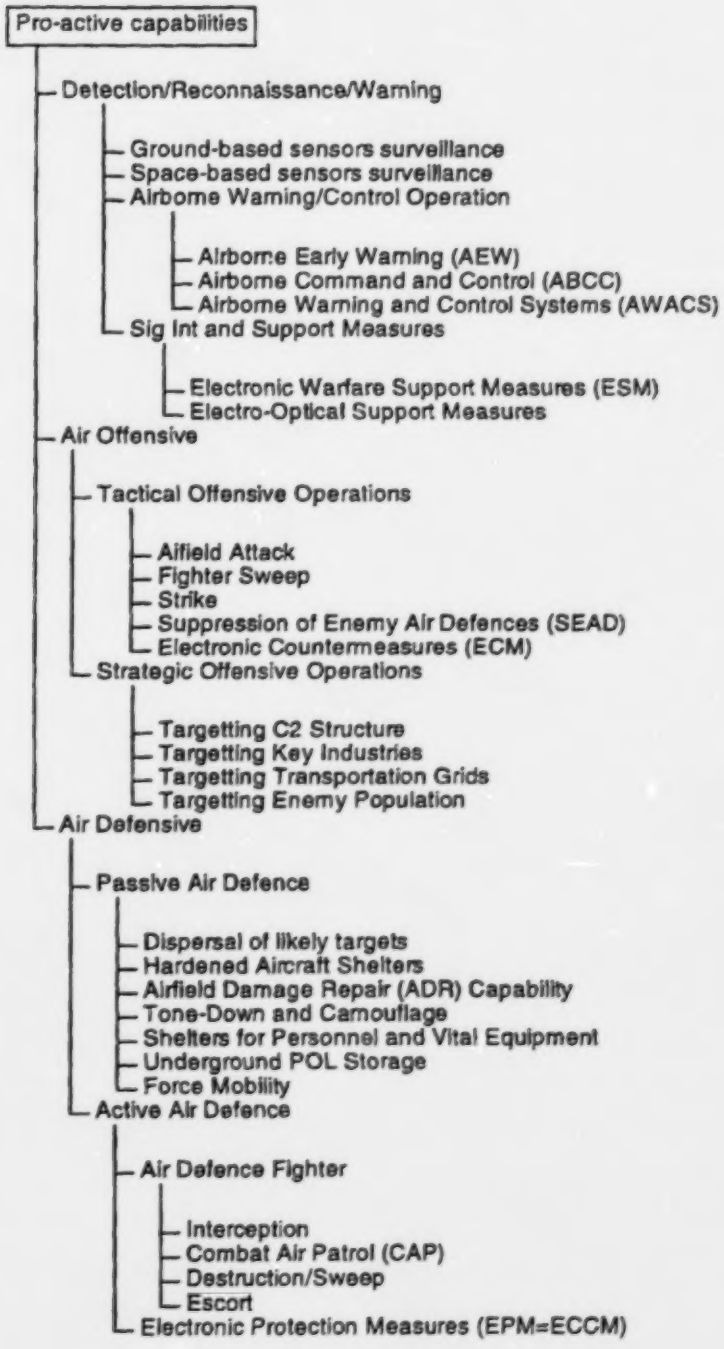


Figure 8 – Pro-active capabilities

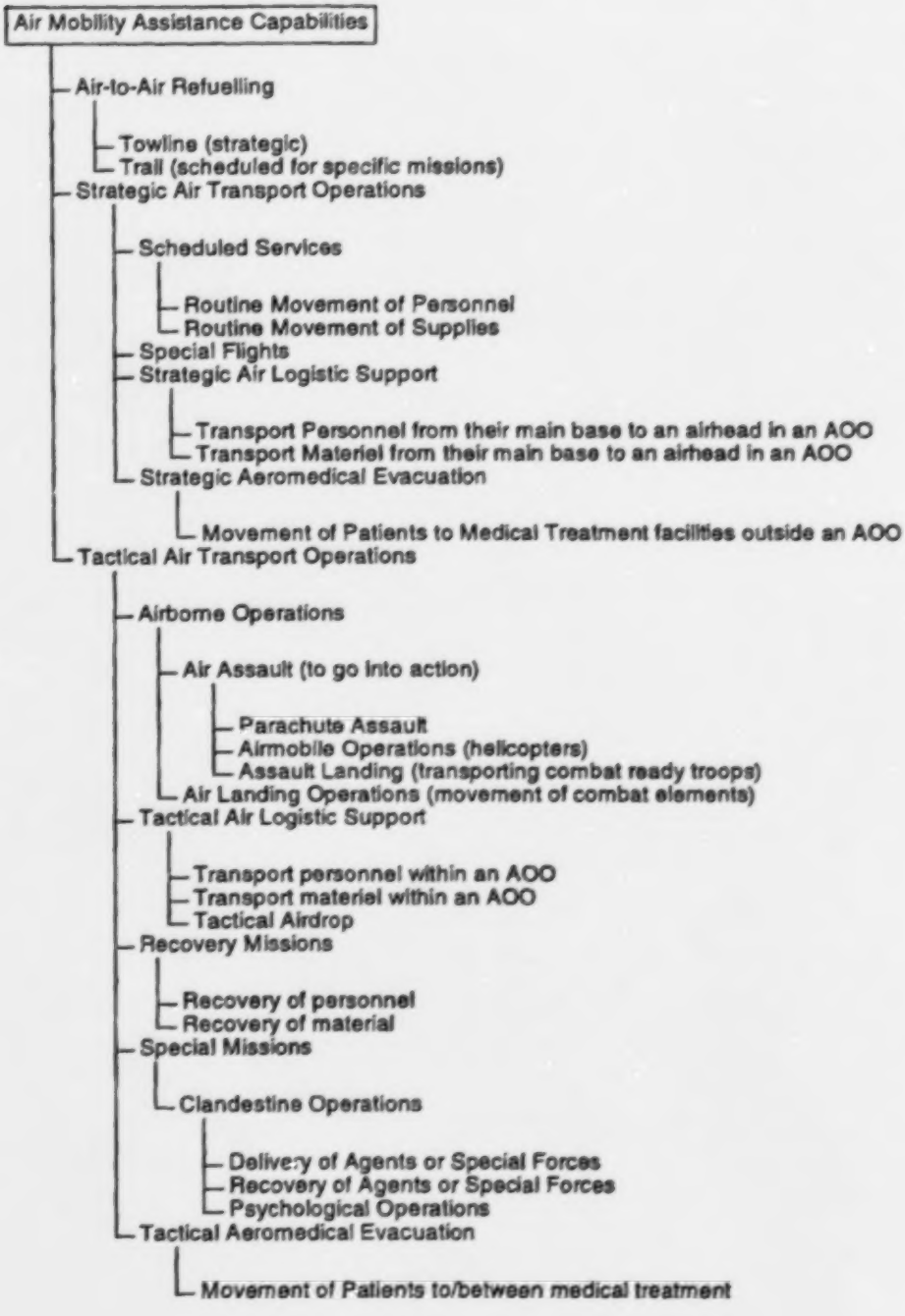

Air Mobility Assistance Capabilities
Air-to-Air Refuelling
Towline (strategic)
Trail (scheduled for specific missions)
Strategic Air Transport Operations
Scheduled Services
Routine Movement of Personnel
Routine Movement of Supplies
Special Flights
Strategic Air Logistic Support
Transport Personnel from their main base to an airhead in an AOO
Transport Materiel from their main base to an airhead in an AOO
Strategic Aeromedical Evacuation
Movement of Patients to Medical Treatment facilities outside an AOO
Tactical Air Transport Operations
Airborne Operations
Air Assault (to go into action)
Parachute Assault
Airmobile Operations (helicopters)
Assault Landing (transporting combat ready troops)
Air Landing Operations (movement of combat elements)
Tactical Air Logistic Support
Transport personnel within an AOO
Transport materiel within an AOO
Tactical Airdrop
Recovery Missions
Recovery of personnel
Recovery of material
Special Missions
Clandestine Operations
Delivery of Agents or Special Forces
Recovery of Agents or Special Forces
Psychological Operations
Tactical Aeromedical Evacuation
Movement of Patients to/between medical treatment

Figure 9 – Air Mobility capabilities

3.4 Sustainment capabilities

The sustainment capabilities represent the infrastructure that is needed to accomplish any AF basic mission. They are presented in Figure 10.

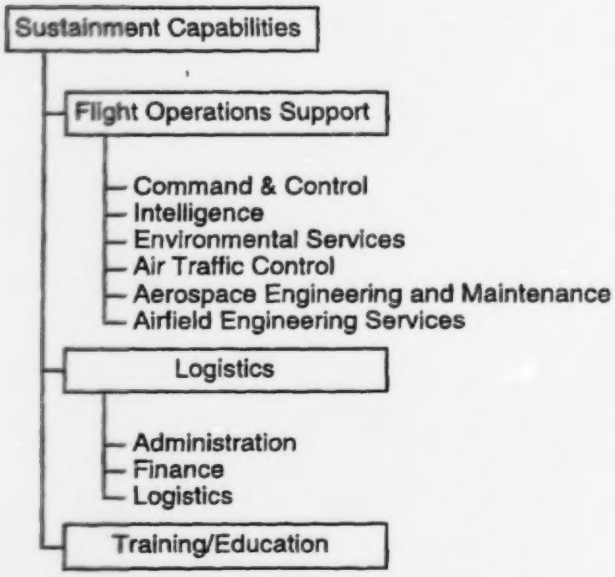


Figure 10 – Sustainment capabilities

4.0 CONCLUSION

This document has presented a decomposition of AF operations that was realized in order to have a better understanding of the Air Force operations. This decomposition presents four different aspects of the Air Force operations:

- "what" the Air Force does;
- "why" it is done;
- "how" it is done; and
- the infrastructure needed to do it.

The decomposition provided in this document is not exhaustive in the sense that it does not cover everything that could eventually be done by the Air Force. Accordingly, this decomposition should evolve in time.

5.0 ACKNOWLEDGMENTS

The author would like to thank Maj. Beaupré for his help in reviewing and suggesting appropriate modifications to these models.

6.0 REFERENCES

1. Department of National Defence, "Chief of the Air Staff Planning Guidance 1998"
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